

Treatments for vibration disease

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MATOBA T, SAKURAI T. Treatments for vibration disease. *Scand J Work Environ Health* 12 (1986) 259–261. It is difficult to treat patients with vibration disease effectively. In the present study clinical data concerning the treatments of vibration disease were reviewed. Physiobalneotherapy showed a 36.7 % improvement rate and had a psychologically beneficial effect upon the patients. The administration of vasodilators or calcium blockers before the patients left home for work in the early morning proved to be successful for preventing attacks of vibration-induced white finger. The efficacy of each drug therapy was approximately 50 to 80 %. The importance of drug therapy increased as the severity increased. Stellate ganglion block proved to provide excellent relief from tinnitus and showed an improvement rate of approximately 65 %. Thus the conclusion was drawn that therapy combining physiobalneotherapy and drug therapy seems to be effective in the treatment of vibration disease.

Key terms: alpha-receptor blocker, calcium blocker, physiobalneotherapy, stellate ganglion block, vibration-induced white finger.

Habitual use of vibrating tools results in vibration disease. The patient is not only afflicted with peripheral disorders, but also with a systemic disorder (3). Although the pathophysiology has been considerably clarified, it is difficult to find fruitful treatments for the disease. During the past 10 years, we have been searching for such a treatment. The aim of the present paper is to present the treatments we have used for vibration disease during these 10 years.

Subjects and methods

The subjects were 500 male inpatients with vibration disease. Their mean age was 52 (SD 7) years. None of the patients suffered from cardiovascular disease. The vibrating tools used included chain saws, jack hammers, and chipping hammers. The average duration of habitual use of the vibrating tools was 10.5 (SD 7.6) years. The patients had been hospitalized in our hospital for, on the average, 105 d. One course of treatment lasted for six weeks. Before and after the course, clinical evaluations were made on the basis of subjective symptoms, physical findings, and laboratory examinations. Twenty-two items of the subjective symptoms, such as Raynaud's phenomenon or numbness of the fingers, elbow pain, stiff shoulders, palmar hyperhidrosis, insomnia, and tinnitus, were evaluated by self-assessment using the five-step method (4). Improvement by two or more steps was estimated as "effective." The laboratory examinations were as follows. The peripheral function tests included threshold for vibration sensation, threshold for pain, a cold

provocation test (one hand immersed up to the wrist in cold water at 10°C for 10 min, after which re-warming rates were measured at 5 and 10 min), grip strength, and a finger tapping test (tapping with one finger for 30 s) (4). Electrocardiograms, electroencephalograms, the results of the autonomic nerve function test using digital plethysmography with auditory stimuli (6), auditory acuity, and radiographs of cervical and lumbar vertebrae, elbow joints, and hands were examined. Blood chemistry, blood cell counts, and a urinary examination were also included. The findings were evaluated by the physician using the five-step method.

The following list shows the contents of the treatment we have used for vibration disease for the past 10 years:

1. Physiobalneotherapy
 - Therapeutic exercise
 - Exercise in a pool (bath)
 - Physiotherapy
 - Thermotherapy: mineral compress, hot pack, infrared, paraffin bath, contrast bath, vibration bath, etc
 - Massage
 - Low-frequency therapy
 - Traction of cervical or lumbar vertebrae
2. Drug therapy
 - Vasodilating drugs
 - Calcium blockers: diltiazem, verapamil, nifedipine
 - Alpha-receptor blockers: prozosin, bunazosin
 - Prostaglandin E₁, dl- α -tocopheryl nicotinate, pentoxifylline, kallikrein, etc
 - Anti-inflammatory analgesic drugs
 - Autonomic stabilizers: ergot alkaloid, γ -oryzanol, sulpiride, etc
 - Hypnotics
 - Others

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3. Nerve blocking therapy
 - Stellate ganglion block
 - Major occipital nerve block
4. Surgical therapy
5. Education for patients

In the physio-balneotherapy, therapeutic exercise, and exercise in a pool (water temperature 38 to 40°C) were applied to all the patients. The other therapies were selected according to the patient. The contents of the education for the patients and their wives included information on the pathophysiology of the disease, the meaning of the therapies, and the general management of daily life.

Results

Physio-balneotherapy

Sixty inpatients with vibration disease were divided into two groups matched for age and occupational experience. One group (P) received physio-balneotherapy alone throughout the six-week test period. The other group (D) was given a vasodilator orally in addition to physio-balneotherapy. The effects of the physio-balneotherapy in this trial were evaluated with the methods presented in the Subjects and Methods section. The improvement rates for the subjective symptoms and the laboratory examinations were 40.0 and 33.3 %, respectively, in group P and 83.3 and 63.3 %, respectively, in group D.

Drug therapy

The improvement rate for the drug therapy ranged between 50 and 80 %. For example, dl- α -tocopheryl nicotinate gave an improvement rate of 83.3 % for the six-week trial. Oral administration of diltiazem showed an improvement rate of 64.7 %.

Nerve block therapy

Stellate ganglion block by procaine was conducted to relieve tinnitus. Empirically, the prevalence of tinnitus in the patients with vibration disease was approximately 40 %. The improvement rates produced by the stellate ganglion block for tinnitus was 62.5 % by patient self-assessment and 68.8 % by audiometric assessment. The hearing acuity partially recovered and was associated with good or partial relief of tinnitus. Eighteen months of follow-up revealed excellent or good relief of tinnitus in 42.1 % of the patients.

Prognosis

The prognosis following the comprehensive therapy in the hospital was "good" for 12.9 %, "good with therapy" for 63.0 %, "fair with therapy" for 14.8 %, and "poor despite therapy" for 9.3 % of the patients for five to seven years of follow-up. According to the

severity, which was classified into four stages (5), a poor prognosis was observed for patients in stage III or higher. It was impossible to return to work. Neuroticism (as tested with the Cornell Medical Index) was shown by 33.3 % of the patients, but depression only by a few. Of the patients with a protracted course of the disease, 25.8 % suffered from hypertension (versus 7.7 % in the acute stages), 9.3 % from hyperglycemia, 11.1 % from abnormal ocular signs in stage II or more in the Keith-Wagener's classification, and 16.6 % from gastric or duodenal ulcer and other diseases.

Discussion

Vibration disease is a systemic disorder due to stressors such as vibration, noise, and cold (3). Physio-balneotherapy is the key treatment for vibration disease. It affects the whole body and leads to the improvement of circulatory, nervous, and motor disorders due to an enhancement of blood flow in injured tissues. Drug therapy, vasodilators, and calcium blockers may accelerate these effects (4, 8). As the severity becomes worse, the importance of drug therapy increases (1). The mechanism of stellate ganglion block for the relief of tinnitus is due to a vasodilatory action, probably due to the suppression of sympathetic nerve activity and supersensitivity by denervation (7).

In general, the clinical course of vibration disease is protracted (2). We should carefully examine the patients for diseases other than vibration disease and should also have many opportunities to come in contact with the patients because a third of them shows neurotic or near neurotic scores on the Cornell Medical Index. The therapeutic exercise and exercise in a pool exert a psychologically favorable influence on the patients. In conclusion, a combination therapy including physiotherapy, balneotherapy, and drug therapy can be effective in the treatment of patients with vibration disease. However, a fruitful effect may not be expected in a short period.

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